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Richmond Medical Journal Print.

1867, III

ON THE CAUSATION OF Diseases.

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Diseases are effects of agents, which have impressed the system inharmoniously, and therefore morbidly. The result sometimes depends on mere excess; sometimes on abruptness of transition; sometimes on conditions of transient or permanent unadaptedness. Thus, there is but a certain quantity of gastric juice secreted; the stomach can endure only a certain degree of repletion or mechanical distension; therefore, if filled too full, or loaded with too much of the best food, it must suffer. So, also, abrupt changes of temperature, or of habits, or of diet, will do injury. We are apt to lose sight of the fact, that the functions must be in accord with the situation—the surroundings; we cannot respire comfortably on a high mountain—we cough, pant, spit blood; sudden heat distends the vessels dangerously, insolation follows, and apoplexy; the fluids secreted in the stomach of an Esquimaux, for the solution of his accustomed seal's flesh and blubber, will act imperfectly upon the rice of the Hindoo, or the dates and gum of the Arab. When fatigued, we must rest before our appetite or assimilative powers are fitted for indulgence in a full meal, and no one unaccustomed to sup late at night, can safely eat largely just before going to bed.

I do not propose to enter here, into the discussion of these incidental causes of disease. We shall find in specific causes—poisons—a most interesting and fruitful topic; and I shall treat, at present, of those which are known to affect numbers at once, rather than confine myself within the limits of toxicology proper. History abounds with records of ghastly and wide-wasting epidemics. In all ages, men have been found liable to loathsome forms of death, carrying off promptly, whole armies, and depopulating fair and flourishing Cities. The wrath of Apollo decimated the ranks of the Greeks, in the war of Troy, and the story of the pestilence which scourged Athens, is familiar to every school-boy. The “Black Death” the “Sweating Sickness,” and the great plagues of Florence and London, need only be alluded to. These maladies are known in Europe no more, and have never reached America. They are assumed, in a general way, to have arisen from the defects of Hygiene of that time, aided by the presence of some infectious or contagious pollution. Such, at least, is the almost universal belief. When we know, with precision, how such terrible disorders are generated, we shall learn why they have died out or disappeared. There are, in London, and all other large Towns, at this day, purlieus as vile and filthy as the worst dens of pauperism in the middle ages; and, happy as we are, that we have not these products of pollution to contend with to-day, we have in their stead, others little less to be dreaded; Typhic fevers, spotted and putrid, Small-pox and Scarlatina, Diphtheria, Yellow-fever and Cholera. Progressive civilization has had, doubtless, a strong influence both on the production and extinction of diseases; but it contains so many elements, that it is difficult or impossible, to point out which of them is to be considered the efficient excitor—the *causa causans*—in any given instance, or the beneficent exterminator in any other. Leprosy, still permanent in the unchanging life of the East-erns, once within the historical period, pervaded all Europe, to an extent that seems to have been overlooked by modern medical writers. It was, and is still, an incurable malady; it was universally regarded as contagious; it was believed to be hereditary. Yet it has gradually diminished and died out so completely, that it is now scarcely ever seen in private practice, or in any of our hospi-

tals. It is hardly credible, that in the fourteenth century, there were about twenty thousand Leproseries in Europe—more than two thousand in France alone—asylums for the wretched lepers; one for the noblesse in Dauphiny, and one in the environs of Paris, exclusively for females of royal houses, “pour les femmes des maisons royales,” the exact phrase of Monteil, in his “histoire des Français des Divers Etats.” And one of the large old churches in London, was built by the Queen of Henry II., as an “asylum for lepers.” But there are now, neither patients, thank Heaven, nor hospitals of this kind.

The occupations of civilized life, afford us examples on the other hand, of the creation or origination of diseases, as well as of their abolition. The one often follows the other, with gratifying readiness, but not always. Lead, as used in the arts, gives rise to severe, and sometimes fatal ailments; but we have learned to evade these by tinning our pipes, and in manufactories, by the employment of sulphuric acid. Phosphorus matches, the invention which, more than any other, separates and distinguishes the cultivated from the savage man, which realizes the old legend of Prometheus, and endows us with control over the most beautiful, useful and necessary existences in the creation, Light and Heat, brought on in their preparation a frightful caries of the mouth and face, now almost unknown; the injurious influence becoming obvious in its nature, was scientifically and thoroughly corrected after a brief course. Mining, whether for coal or ore, does not exhibit in our new Country, and in the conditions of progress active here, the deleterious effects upon health and longevity connected with it every where in Europe. The wet and dry grinder in England, have long been doomed to premature old age and early death. “A grinder,” says Chambers, “sits on a block of wood, which he calls his ‘grinding horse,’ and his grindstone is before him, turned on an axle by steam or water. To this, he applies the article to be ground, and a spray of fire arises at every touch. But the fire is not the worst. The stone itself, wears away in foam-like surges, that fill the lungs, and in a certain number of years, calculated by statistics to a nicety, kill the principle of life. A dry-grinder does not reach thirty-five, a wet-grinder may defy death for nearly ten years more.

The men themselves, and they number between 2000 and 3000 in Sheffield alone, like their fate rather than otherwise, insist on their trade retaining its fatal noxiousness—because, if this were removed, there would be a greater competition of hands, their high wages would come down, and their deep drinking be cut short.” As Elliott has it, in his “corn-law rhymes”—

“ There draws the grinder his laborious breath,
There, coughing, at his deadly trade he bends;
Born to die young, he fears nor man nor death;
Despair and riot are his bosom friends.
Bid science on his cheek prolong the bloom!
He will not live—He seems in haste to gain
The undisturbed asylum of the tomb;
And, old at two-and-thirty, meets his doom.”

But, in spite of his insane resistance to corrective measures, science has reduced, very greatly, his peculiar risks and liabilities, and indeed, among us, may be said to have obliterated them, by improved mechanical processes.

Scurvy, once a generally prevailing condition in all dense populations, has been almost done away with, by the varied diet of vegetable and fresher animal food, attainable under our better husbandry, and is now seldom seen, except on board ship in long voyages, in ill-supplied armies, and ill-managed prisons and poor houses.

A constantly increasing attention to cleanliness and proper clothing, in addition to the better food, just spoken of, have done much to mitigate the prevalence of scrofulous and cutaneous affections. I wish I could say the same of many connate maladies, depending on the nearly universal neglect of ventilation in our domestic architecture. Not to speak of the hovels of the old world peasantry, or the crowded dens in Cities, take from the *Atlantic Monthly*, for July, 1866, the following recent description of the “Homes of New England:” “In the Winter, the windows are caulked up and listed, the throat of the chimney is built up with a tight brick wall, and a close stove is introduced to help burn out the vitality of the air. In a sitting-room like this, from five to ten persons will spend about eight months of every year, with no other ventilation

than that gained by opening casually and shutting doors. A late writer raises the question, whether the community would not gain in health by the demolition of all dwelling houses. Through the valley of the Connecticut, the bed-chamber will be the concentration of all forms of bad air. The house is redolent of the vegetables in the cellar, and this fragrance is confined and retained by the custom of closing the window-blinds, and dropping the inside curtains, so that neither air nor sunshine enters in to purify. Thrifty country house-keepers, often adopt the habit of making their beds on the instant after they are left, without airing the sheets and mattresses; and a bed so made, gradually becomes permeated with the emanations of the human body, so as to be a steady corrupter of the atmosphere."

Collate the above with what is said by Bartlett, when discussing the continued fevers of our Country, contrasting Typhoid with true Typhus, and insisting strongly upon the error of ascribing the two to similar modes of causation, and on the inefficacy of hygienic measures, to prevent the former: "Do my friends believe that any cleanliness, any ventilation will avail here? Let them try it when Typhoid fever prevails, as it so often does, and so extensively, during the beautiful and breezy Indian Summer, amongst the most cleanly, the most temperate, the best clad, the best fed and the best sheltered people, that this world has ever seen—the rural population of the Eastern States." (P. 214. Note.)

It is certain, that mere domestication, a word which implies warmth and shelter, as well as the confinement within warm and sheltering buildings, is unfriendly to all wild animals. The caged lion, tiger and monkey, are miserable, scrofulous or tubercular, and short-lived; the horse and the cow, and even the sheep, have become delicate and sickly, and liable to destructive epizootics, the Murrain, Rinderpest, Pneumonia, Malignant Pustule and Glanders. Even the hardy wild boar, is so deteriorated in constitution, by the artificial modes of living, and breeding and feeding, that his descendant races are now very widely regarded with distrust and suspicion, as proverbially strumous, and of late, still more emphatically as the chief focus of parasitic intrusion, as in Trichiniasis.

Tuberculosis is unquestionably spreading its gloomy sway over the highest types and conditions of our modern civilization; the

ravages of Phthisis are annually extending more and more widely, and occupying always, and every where, the highest place in our bills of mortality.

When we take up the study of endemics or local diseases, we shall also find it difficult to ascribe the proper share in their production to the several elements present and influential; the social state already treated of, with all its involved modes of agency; the peculiarities of tribe or race, and the topographic or climatic circumstances. Why should the Pole, alone, be subjected to Plica? There is no observable peculiarity in his scalp or its hairy covering. If he is filthy in his habits, so are the poorer classes of many tribes and nations, savage and cultivated. Why should the Lombard suffer exclusively from Pellagra? Maize, used for food by the people, has been suggested as the source of that terrible disease—which if not exclusively confined to Northern Italy, is scarcely known elsewhere. Maize is eaten as abundantly by many other populations—in all its varied qualities has certainly long formed as large a proportion of the diet of our Indians, and of the white men who have taken their places on the earth's surface. Hameau suggests that we get it somehow, from sheep; but sheep exist every where.

Why is Yellow-fever the constant resident of certain situations, and why, under contingencies, apparently similar, is it in certain other places altogether unknown? In the Gulf of Mexico, and the islands of the Caribbean sea, it does not fail to show itself during the hot season; on some portions of the African shores, while the natives seem exempt, it is always ready to assail an exposed visitor. It has never been met with in Asia, and rarely visits Europe. Familiar on our Atlantic coast, the Cities of the Pacific seem almost free from it.

It is easy to mention numerous instances of still more remarkable narrowness of domain, occupied by particular maladies. The "Aleppo Evil"—"Aleppo boil"—"Bouton d'Alep," is one of these. Unheard of, except in that immediate region, on the banks of the Coik, the Tigris, the Euphrates, at Moussoul, Diarbekr, Bagdad, its centre is the City whence it derives its name. "The natives of Aleppo," says Willemin, "are universally subject to it. It develops itself in early life, generally during the three first years.

Strangers sometimes escape it, even after long residence, but some are attacked after a very short stay." Such was the fact with the celebrated female traveller, Madam Pfeiffer. It may show itself in one month, or not until some years—even after removing from the dangerous region. It mostly attacks the face; there may be but one button or tubercle, or many; it often lasts a year.

Equally obscure and undetected, are the local causes which produce the gangrene of the rectum, in Brazil—the Barbadoes Leg and the Radesyge of Norway. Boudin furnishes us, in his valuable work on Medical Geography and Statistics, with many other similar instances, in which some local peculiarity, whether of air, water or diet, hitherto undetected, inflicts its evil impression—more on the indigenous population, yet not altogether sparing the occasional visitor or temporary resident.

Of still more general interest, are those maladies, which, while specially prevalent in one region, are traceable in other localities, presenting similar topographical contingencies. Of this sort, we may mention Goitre—Bronchocele, with its attendant Cretinism. Terribly frequent in the Alpine Valleys, it is also familiar among the Pyrennean Cagots, and may be met occasionally in all parts of the world—even where it would be difficult to detect any of the circumstances, to which it is ascribed as an endemic. McGowan, in a paper, read not long since to the American Ethnological Society, says that he finds it prevalent on the Juniata, and in the lateral valleys of the Susquehanna, and on the acclivities of the Blue Ridge, in Virginia—mostly restricted there to negroes and mulattoes. Dr. Merrick spoke of its prevalence in Panama. M. Squier had observed it in Peru and Nicaragua. S. Navarro, Mexican Consul-General, stated that, in certain portions of Mexico, Goitre and Cretinism prevailed, both among Indians and Spaniards. Our own Indians are exempt from it—McGowan thinks from their migratory habits. Sporadic cases are met with everywhere, however, as if spontaneous and from unknown causes. Snow-water, lime-water, want of ventilation, as in pent-up valleys, monotony of diet—all these are assigned as producing it.

Is the question absolutely settled yet, when and where began the scourge of the venereal pollution? Was it American in origin,

and unknown in Europe until after the voyage of Columbus, or a new development in Europe, at about that time, or an old European disease, suddenly aggravated into a wide explosion—or, as some have ingeniously suggested, the result of promiscuous indulgence of two races, uncongenial in constitution and habits! I will not pronounce here, any dogmatical decision; nay, I do not hesitate to say, that a ready debater might accept and maintain either of these views, with very plausible tenacity.

When, and where too, did Small-pox first show itself, or Scarlatina, or Measles, or Whooping-cough? If any of these seem to originate now, without obvious source, the fact is looked upon as curious and unintelligible; nay, we would be as likely to expect the advent of a new animal, as either of them, notwithstanding the speculations so often indulged in, which we shall hereafter take into consideration.

Some diseases remain tenaciously fixed, as we have seen in certain localities, while others disappear with the progress of time, and the changes of condition and circumstance. Instances are numerous of both kinds. Fevers and intestinal diseases are as rife as ever in the Roman Campagna, and many parts of Asia and Africa. Cutaneous affections, as old as the races, continue to haunt the poor of Syria and Persia; and in the same regions, Leprosy still exists, and the Plague. But the Plague no longer assails any portion of Europe, out of Turkey; and Leprosy, once common, is so rare, that we may consider it virtually extinct. Here and there, too, in Europe and America, we can point out particular spots, whence the ancient fevers have been driven, or have disappeared, and new ones have taken their places. We learn, that even in Africa, and in the hot climate of Algiers, a thriving City of colonists has been planted in one of the most fatal districts, occupied by the French, and Bou-Farik flourishes in comparative salubrity. It is not uncommon, to notice such a change in our own Country; Towns grow up in low places, at the cost of a sad proportion of lives. Bou-Farik presented a bill of mortality, for some time, of 70 per cent. during its struggle for existence; and New Orleans was, for a long while, a most insecure residence, while going through the series of changes, which, as Harris tells us, have resulted in its becoming as healthy a place

as New York. We learn thus, to make distinctions among endemics or local diseases, and to ascribe some of them to causes that may be controlled, and others to unchangeable and permanent conditions. Some of these, we think we know, and discerning, feel ourselves able to contend with them at advantage.

The most familiar and widely-spread of all endemics, is periodical fever—Fever and Ague. Our Profession, generally, has agreed to ascribe it to a special cause, which Headland calls the “ague poison,” and which we conventionally designate as Malaria—a word insignificant in itself. There are a few dissidents—some maintaining that there is no proof of the existence of any specific poison, others going farther, and contending for the sufficiency of incidental, or patent and obvious causes, heat, cold moisture and their alternations. I consider the point to be as well settled as any other in pathology. Intermittent fever, is confined within known limits, uniform in its features, characteristic in its history, amenable to a specific remedy; in all these circumstances differing from all incidental maladies.

When we set ourselves, however, to investigate the nature and source of this ague poison, we are met by almost insurmountable obstacles. Exceptions to all apparent rules, beset us on every side. We find these fevers most certain and most rife, where heat moisture and vegetable life are prominent, in degree and amount; yet, we also find them where each of these elements is wanting, and fail to find them occasionally, in places where they are all combined. Heat alone, is present in Malta and certain other rocky islands in the Mediterranean, notoriously subject to periodical malarial fevers. These are among the most arid spots on the globe—no vegetable growth existing there. The same fevers are found in the cold climates of England, Holland and North America, but are unknown in Australia, where intense heats prevail. Moisture abounds in some of the above mentioned places; but moisture alone, or even with heat, does not always suffice. These fevers are unknown in mid-ocean, under the line. Moelmyn, in Hindostan, Point de Galle, in Ceylon, and the bayous of Louisiana, and the Dismal Swamp, are exempt. Vegetable matter, so generally present where the fevers abound, may be dispensed with, as on the sandy plains of

Spain and Portugal enumerated by Fergusson, and numerous localities specified by Davy.

Certain points in the history of this poison, assuming its existence, seem to be established; it has weight; low places and ground floors are most subject to its influence; obstacles, walls, hedges, &c., arrest it; it has not self-repulsion, or diffusive quality; as is proved by the singular limitation of its agency recorded by the best authorities—one side of a road, a river, or even of a house, being affected; it is moveable by winds, however, over distances variously stated—by Lind, at a cable's length from the productive shore, ships were safe; by Allan and Davy, the perfect security of vessels moored, even within the reefs. Exceptions here occur; it has been blown a mile or two off shore; up the side of a mountain. Scherzer tells us of some persons taken ill on board the ship, while others of a shore party escaped.

The failure of all chemical analyses, and all eudiometric tests, seems to prove that it is not a gas. Until very recently, no one has announced, with any confidence, its detection in any palpable shape. Boussingault and Hume, it is true, found some dark carbonaceous matter left after evaporation of dews from foul places; but the experiment has been frequently repeated by Drake and others, with no similar result.

My distinguished predecessor, Prof. J. K. Mitchell was led, by reflection on the symptoms and history of intermittent fevers, to the opinion, that their cause must be a living organized agent—ultra microscopic, as not having been detected—vegetable from its connections and from the fact that animalculæ, are rarely poisonous—a fungus because fungi are thus deleterious very generally, and fungi usually abound in fever spots. This hypothesis he has most ably argued in a little work, containing the substance of his opinions on the subject.

Prof. Salisbury, of Cleveland, Ohio, impressed with the same views, pursued a similar series of researches, employing more hopefully, and with intense zeal and perseverance, the improved means of physical exploration. He announces to us, the success of his inquiries, in the discovery of the ague poison, which he finds to be an Alga of the species *Palmella*, a minute, but visible sporule. He

examined, patiently and assiduously, the excretions of the sick and the surface of the soil where they were attacked. Amongst great varieties of algoid and fungoid cells, he found this only to be uniformly present. Covering the soil, or destroying its surface with lime, he remarked that the fevers ceased to occur; removing a portion of the soil with this algoid growth upon it, to healthy spots, in three or four instances he found that fever attacked those who were in close propinquity to it.

In all malarious places that he examined, the ague-palmellæ were found growing in profusion. If his statements are confirmed, by farther repetition, and in the hands of additional observers, we shall admit, without hesitation, that one source of periodical fever has been fairly detected. But we must not generalize too hastily. Even after the relation between the poisonous palmellæ, and the febrile attacks shall have been established to be causative, and not merely coincidental, we shall by no means regard it as proved, that these algoid spores constitute *malaria*, or are to be considered as the exclusive producers of periodical fevers. These maladies occur, as Davy has shown, in great numbers, in every form and every degree of intensity, on some of the most arid spots on the surface of the earth. We have already mentioned Malta, as notorious for its fevers of this type, and Via and several other rocky islands of the Mediterranean, where the tables kept by the British Army Surgeons are full of mortality from, and their hospitals crowded by every variety of intermittents and remittents. The seeming contrasts and caprices too, which present themselves, must be fully weighed as objections to this assumption. Low, moist places in Ceylon, likely to abound in algæ and fungi, are habitually healthy; others similar, are healthy at one time, and then unhealthy. Livingston tells us, in his Travels, that on the Ue, where every thing was wet and sloppy, and covered with fungi, there was no fever. And when we reflect on the tenacity of these fevers, the obstinacy with which they recur, even when patients have been long removed from the point of first attack, we find still greater difficulty. Dr. S. tells us that the palmellar spores may be evolved in the body, and that they are eliminated from it, for he finds them in the expectoration and urine of patients. But how long will they continue

to find a nidus for the development of successive germs in cases of intermittents, which we know may endure for months, and even years? And again, as to the interval, Dr. Mitchell ingeniously suggests the death of one generation of fungus sporules, and the development to maturity of the next, thus constituting periods. But when these periods change, and a quotidian becomes a tertian, and a tertian a quartan, is it possible that the periods of development and growth of the germs can thus vary?

After the interval of a Winter, intermittents often return upon a patient, even after he has removed far from their source. Have the palmellæ spores remained dormant in the system thus long? I know that none of these unanswered questions, involves an unanswerable objection. I admit that our ignorance on these obscure points in pathology, must not stand in the way of any truth, when it is proved to be the truth—established; but meanwhile we require their due and impartial consideration.*

Can there be any connection between the bodies found in the blood, in Marsh Fever, by Frericks, and described as pigment granules, and these fungi of Salisbury? Dr. Meigs, of this City, has also observed them. On pricking the finger, and placing a drop of blood under a quarter-inch lens, it was seen that the red corpuscles were not more than one-quarter as numerous as in health, the white corpuscles normal—while in the field there were numerous minute particles of irregular shape, with angular edges of blackish colour, and entirely opaque. It is supposed that the red globules are destroyed, and their red matter converted into black pigment, which is carried into the vascular apparatus of the body. But—conjecture for conjecture—if there be fungus sporules (palmellæ, &c.) diffused through the blood, they must die and change to carbon, assuming a dark colour, and presenting the appearance above described.

The universal family of man seems to be subject to the evil influence of the agents which cause malarial fevers. But there is much difference in the degree of liability. The white races are

* Since the publication of Prof. Salisbury's interesting paper, several claimants have presented themselves in Europe, who urge the right of prior discovery. Among them, are Lemaire, of Paris; Vin den Cuyper, of Brussels; and Dr. Haemon, for Prof. Morten, of Liege. None of them, however, has, like him, stated his views clearly and definitely. He is the true discoverer, if the discovery be established and confirmed by future experiment.

specially prone to suffer. Boudin and Brace, tell us that the Hebrew tribes are obviously, less so than all the other white peoples. They alone, increase in population in Algeria; they alone "keep up their number" on the Red Sea. The black races enjoy great comparative immunity; the Kroomen of the African Coast, and the inhabitants of Fernando Po, most strikingly. Yet Livingston had many cases of fever among his native attendants. In our own Country, the black escapes best the more intense malaria of the low swampy rice fields. In the less fatal uplands, where the white man may live, doubtfully, and cultivate cotton, they are more liable to fevers than below. Paradoxical as this may seem, it is established upon the best authority—especially in Georgia and Alabama.

Even in the birthplace of the Red Man, as Gibbon and Herndon assert, the negro is safer than the Autochthon—the Indian, who ascribes to the presence of the white intruder and his plough, the destructive fevers, unknown to his savage ancestors. The tawny tribes are not universally exempt. In Hyderabad, Napier tells us, they suffered equally with their white invaders, and Colonel Shakspeare, in announcing the value his Hindoo mountaineers set on tobacco as a febrifuge, incidentally informs us of their susceptibility to Fevers. So the Chinese suffer in Panama; yet there must be a great difference between them and the Whites. Martin affirms that the Whites cannot become acclimated in Hindostan; nay their progeny has never, in any instance, arrived at the third generation.

It is among these tawny nations, however, that we find examples of the most complete immunity from malarious fevers. The Tamul tribes generally, are affirmed by both Brace and Hodgson, to enjoy this great privilege; the Bhotiga, the Mishnies, some of them living on the declivities of the Himalaya Mountains, others in the lowest region at their feet, the basins of the Tista, Gandake and Burrampootra. "They are generally fine, healthy races of men," says Brace, "though dwelling where no other human beings can exist,

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I have already mentioned the capricious appearance and non-appearance of the Periodical Fevers, which show the presence of malaria in certain places. Attempts have been made in various

localities, to calculate the frequency and rate of these occurrences, and to reduce them under some rules of periodicity in these respects. What we know of the matter, clearly, is this; that where these Fevers exist permanently, where their cause is annually reproduced or perennially present, as proved by the sporadic occurrence of cases in every hot season, there happen, from time to time, regularly, or irregularly, occasions of Epidemic spread of the Endemic calamity. It will require a long protracted series of careful observations to determine why it is so; whether because circumstances have favoured the development of the material cause in greater quantity, on a wider scale, or in enhanced intensity, or have acted upon the exposed bodies, so as to produce a greater susceptibility to its impression, or whether there is a recurring cycle of activities of any special nature, obvious or undetected, which we may refer to.

But I must pretermit for the present, any farther discussion of a topic fruitful of interest in itself—full of obscurity and difficulty, and, as yet, admitting rationally of much scepticism and difference of opinion.

Not less important among the causes of Diseases, is Contagion, the subject upon which I shall next direct your attention. It is among the most lamentably familiar facts, which are universally known, and have been observed from the earliest times that certain maladies spread themselves, as from centres, extending in various directions, independently or indifferently as to the topographical conditions, which limit the prevalence of the Epidemics, of which I have been speaking. Known under the heads of General Epidemics and Pestilential Maladies, they obviously divide themselves into two classes, recognized by general or universal consent in certain strongly marked instances—the one as coming from undefined unrecognized contingencies, diffused widely over earth and sea, as Influenza; and the other class as clearly depending upon a palpable connection, or inter-dependency among themselves; these latter we call Contagious affections. They are numerous and varied, and are found among all the classes and orders of Nosologists. The modes of their connection, or mutual relation vary; no two, indeed, being precisely similar in this regard. There are few points

in pathology, upon which the Profession is so much at dispute as these. An intense unwillingness to accept the allegation of a contagious character, as belonging to any Epidemic, exists in the minds of a large school of Physicians, who demand what the Irish orator calls "an Ossa upon a Pelion of evidence," before they yield their incredulity. For my own part, I will avow at once, and freely, that in the Natural History of Diseases, the more I have studied them the more reason I have found for laying down the general rule, that "like has a tendency to produce like," and that the exceptions among specific diseases, are comparatively few. The *causa causans* of any malady, whatever it may be—a pestiferous exhalation; an altered secretion; a new deposition; a cell formation, of peculiar character; a morbid excretion; a parasitic production, animalcular, fungoid or algoid, vitalized or semi-vitalized, individual or in Vogel's phrase, endowed with semi-individuality—if generated within a diseased human body, or any part of such a body, and capable, if brought in any manner to act upon a healthy human body, or any part of such a body, of afflicting it with the same diseased condition, in which it took its rise, is a Contagion. Any disease so conveyed or communicated, is a contagious disease. The matter of contagion—the substance possessed of this subtle property of self-production or generation, has never yet been clearly detected or set apart from its surroundings. Even in the parasitic maladies, it is doubtful what share the parasite has in the actual causation. Sir H. Cooper affirms, that the *Acarus Psoræ*, gives rise to various, not one, exclusive cutaneous disease. "There appears no one specific eruption, which indicates the presence of the *Acarus Scabiei*. The nature of this is determined by the temperament or predisposition of the patient. In one case vesicles, in another papular, in a third pustules are the result," and indeed, if the creature himself be the exclusive source of irritation, the Itch is no more a contagious disease than the *Morbus Pediculosus*, or *Trichiniasis* or *Tenia*. Its reception into this class of maladies, properly depends upon the answer to a question, never yet raised, so far as I know. The propagation of itch, may be ascribed to one of these sources; the animal himself to be transferred, or the ova within or without the insect, or the fluid of the vesicle in which he lives.

The latter may be capable of reproducing the disease, of which the animalcular is an appendage. So it may be inquired of Mentagra, Favus and other maladies of fungous character. Are the vegetable growths the cause or effect of diseased action or condition? The crusts being transplanted, the disease, doubtless, is extended—but is it not by the animal portion of the crust? If it be the fungus, which constitutes the disease, must we not pronounce upon Prof. Salisbury's views, that malarial fevers are contagious? The Palmellæ are as transportable as Psora or Muguet. Indeed, Londe maintains, in an essay, read before the French Academy of Medicine, that every Contagious Virus, must necessarily act as a living being—it must possess vital properties. Mere poisons, he argues, of whatever nature, affect the body mechanically or chemically, overpowering the vital forces, and being destroyed by their own action upon the tissues and fluids; this decomposition being a law of chemical affinity. “Any heterogeneous substance, which when introduced into a living body, shall remain inactive in it, for a certain length of time, then become active and multiply in it, and then leave it to act upon another body in the same manner, must possess a living principle.” In a paper, read before the Epidemiological Society of London, 1851, by Mr. Grove, the philosophical author of the received theory of the “Correlation of Forces,” these views are most ably wrought out. His object, he avows, is to show that the poisons inducing Epidemic, Endemic and infectious diseases, must be ranked among the things endowed with life. “He argued, that the faculty of reproduction, was a distinctive mark between animation and mechanism, or between living and inanimate matter; that it was during the reproductive period of existence, that the most energetic operations of the vital force were manifested, and that it was during the reproduction of the poison-germs, within the body, that the force of diseased action called for our special notice. He directed our attention to the fact, that whether we examine an epidemic or infectious disease of plants, or of animals, or of man, we find that the essence of the affection is something which has the power of reproduction.

Taking this power of reproduction as indicative of the existence of a germ, he classes these agents of disease among living things,

and regards reproduction as their primary law. He then goes on to infer, that if this be a correct interpretation of nature, the germs of diseases ought to acknowledge obedience to the same subsidiary laws, which regulate and influence animate existences. He divides those laws into two classes, the first acting upon faculties or properties inherent in the germs; the second governing the action of external agents or influences upon them. The laws, which he designates, ten in number, he tells us are not laid down as absolutely definite expressions of a comprehensive idea, but merely as the readiest approximations—

Objective Laws.

1. The diffusion or dispersion of germs.
2. Their Static existence.
3. Their duration of active existence.
4. Their period of development.
5. Their intermittent reproduction.

Subjective Laws.

1. Seasons of Activity.
2. Climatic influence.
3. Relation to Latitude.
4. Subjection to physical forces.
5. Influence of locality.

He went on “to demonstrate the application of these laws to the agents of disease, and their analogies in the vegetable and animal kingdoms—and show the impossibility of accounting for epidemics and infection upon the chemical basis; seeing that in no purely chemical process, was there any multiplication of the agents, and that as far as physical forces are concerned, one always increases at the expense of the other; as heat increases by the chemical change taking place in combustible bodies and their destruction.”

The matter of contagion, is the usual generative cause of the contagious disease whence it takes its origin; but can we pronounce it to be the only cause—the exclusive source of such disease? The assumption, I think, would be hasty and untenable, though it has been so generally received and held so strongly, as to have become the foundation of one of the most familiar objections against the alleged contagiousness of any malady, and the argument is often pressed, as if conclusive, that “a disease, having arisen spontaneously, as it were, sporadically or independently of previous cases of the same kind, from whatever contingencies it may be derived, is proved not to be contagious in its character.” But let us consider. Every malady must have had a beginning; it must either have been created as a separate entity, which will scarcely, we think, be sug-

gested by any scientific inquirer, or it must have arisen from and under certain contingencies, which developed it, or favoured its development. If the latter be the correct view, it is unsafe to affirm, that the same contingencies can never again occur. Take the case of Small-pox. No one expects or fears to meet with a sporadic or spontaneous case of Small-pox. It would be entirely out of the course of our ordinary experience. But observation and experiment have proved, that if such a case should present itself, there would be no necessity for recurring to miracle, or even special Providence, for an explanation. Many erudite Physicians admit the identity of Vaccine and Variola. Bouley and Dupaul maintain, that they both find a common origin in Aphthous Stomatitis of the Horse, from the grease on the heels of which animal, Jenner, himself, thought Vaccine, at least, was derived. But nobody doubts the frequent spontaneous occurrence of Vaccine in the cow, or of grease or stomatitis in the horse; animals with which our human race is so frequently in close contact, that we may readily derive from them the germ of Small-pox, which shall only require certain fostering conditions for its modified development into Variola. Again, Thompson, Cross, Hennen and many others, are satisfied of the close affinity in nature, if not the absolute identity, of Varicella (Chicken-pox) with Variola (Small-pox.) I confess, I have very little doubt of their intimate connection. The authorities above mentioned, recite numerous instances, in which Chicken-pox, which we often meet with sporadically, has produced Small-pox. Davy speaks of their closely intermingling, in Malta, under his careful observation, and confesses that he regards the diagnosis as doubtful.

Scarlatina was once observed by Gregory himself, as he supposes, to have occurred sporadically from exposure. Measles, or a cutaneous exanthem, very like it, has been excited by the fungus emanations from mouldy straw, as Salisbury contends—and so of many others. The Typhic group of fevers, true Typhus, Typhoid, Relapsing fever, may all happen as the result of conditions, that newly affect individuals or masses of men; may be generated in a close ill-ventilated dwelling; an ill-ordered prison; a crowded emigrant ship; a foul alley. I know that Watson, and others, still

affirm, that these continued fevers arise from contagion exclusively, but this is a narrow view of the matter. On the other hand, Bartlett and the majority of our American brethren, show a reluctance to point out the cause of our familiar Typhoid, or to ascribe it to its true source in human exhalations, neglected and festering, and many absolutely deny that it ever arises from contagion. That all these fevers are capable of springing into existence, under the circumstances indicated, seems to me as clearly proved, as that they become contagious as soon as they are developed. Contagious diseases, then, may have more than one source. Contagion has but one, that is in the specific actions of the malady, from and during which it arises and is generated. Its nature consists in its power to reproduce that malady. Each variety of contagious matter has its special elective affinity, as well as its special potentiality. One acts on the skin; another on the digestive organs; one on the mucous surfaces; another pollutes the blood. Some are volatile and diffuse themselves in the air; some are fixed, but obey the universal law, *corpora non agunt nisi soluta*. We may keep small-pox and vaccine matter in the dry state, but they must be dissolved before they will act. The cholera poison is plausibly supposed to be mingled with the dust of the soil, where a regiment or caravan have suffered the disease, and thus raised by the winds, to be driven against and inhaled by unfortunate passengers, acting when moistened by the sweat or the mucus of the mouth and nostrils. Some, and among them, happily for us, the most deadly, the hydrophobic virus, require to be intruded beneath the protecting integument, and will not affect us but through a wound or abrasion. I have said that it has never been secerned—that we do not know the appearance of any form of contagion. It is connected with the cell, as in Small-pox, Syphilis and Cancer; with the amorphous stroma or deposit, as in Tubercle; with the blood, as in Scrofula and Scarlatina. But neither by the microscope nor by the minutest chemical analysis, can we distinguish the pus globule of Small-pox or Syphilis from the most laudable pus of the Surgeon, nor detect any peculiar substance in the blood of the most pestilential malady, nor in the saliva of the rabid animal. Nor does the chemist detect in the atmosphere, the cause of those contagious diseases which spread only through the atmos-

phere, or chiefly in this way. We are aided by the sense of smell, very usefully, however, and ought to be warned by our instincts, that offensive air is apt to be injurious. It is unquestionable too, that many diseases give out peculiar odours. Scarlatina is in this way remarkable, and measles, and I think Puerperal, and some other Fevers. But there is nothing of the sort observable, so far as I am aware, or ever heard alleged, in Pertussis or Muraps, both of which diffuse themselves atmospherically.

The epidemic spread of all the febrile contagions, and of some not usually ranked as febrile, is a very striking and obscure phenomenon. In all civilized, and many savage populations, Variola is a constant denizen. Our bills of mortality, in large Cities, never fail to enumerate a death or two weekly or monthly, many, more or less, annually, of it, as well as of Scarlet fever, Measles, Typhic fevers, of every diversity, Diphtheria, &c. But, as you are aware, every now and then we are annoyed and panic struck by the large and unaccountable increase of the deaths ascribed to one or another of these diseases—which we then denominate epidemic. The suddenness of their explosion is, at times, appalling.

We have a minute and interesting history of the outbreak of Scarlatina at Eastbourne, a very healthy and popular watering-place on the English coast. An imported case occurred there on the 2nd of September; another was seen on the 4th, then “the virus lay dormant, seemingly, until the 13th, when seventeen cases presented themselves to one Physician, and on the 14th, twenty cases to another; the experience of other Practitioners was similar. There was no indication of the silent danger; no apparent evil to be averted or shunned. The epidemic, too, made its appearance in the highest circles, in the best and largest houses; in no isolated area; in the vicinity of no palpable nuisance, but instantaneously at various points, in fine, new, well-fitted dwellings. Prof. N. S. Davis gives a somewhat similar account of the epidemic spread of Small-pox in Chicago, in 1855: “Previous to the 1st of January, there were so few cases in the City, that the subject had attracted no attention, only one instance having come under his observation. Between the 6th and 10th of that month, it sprung up, as if by magic, in almost every section of the City.” Similar is the history

of the outbreak of Cholera in Sunderland, in 1831; similar the record of the visitations of Dengue to Charleston, in 1828 and 1850; similar the sad invasion and spread of Yellow fever, almost always.

“Epidemic Influences” are not seldom spoken of, as something peculiar and apart, as differing in nature from the known causes which produce the ordinary progressive extension of diseases. “It is clearly apparent,” says Prof. Davis, in the conclusion of his instructive paper, quoted above, “It is clearly apparent that the City had been visited by a *distinct* variolous *epidemic* influence.” He does not suggest in what this distinctness consists. The subject is too obscure almost, for a reasonable conjecture, but as we are in this case of Winter prevalence, and in that of Eastbourne, precluded from any reference to the insalubrity of atmosphere or anti-hygienic conditions, I will venture to propose the hypothesis, that the difference between the instances of slow diffusion, and those of dispersive explosion, rather lies in the character and type of the malady itself. It seems certain, that cases of Small-pox, or any other contagious affection, differ greatly in the degree of germinative power they possess, one will affect many or all within reach—another none, or a small proportion. Nor is it the most violent example in degree, which would be most likely to prove efficient; protraction into maturity and a prolongation of the stage, at which virulent emanations are given off, would be most dangerous. It appears altogether probable too, that the condition of a population may be of importance, regarding them hygienically—that a well-fed, well-clothed, well-sheltered community would be less liable to these all inclusive pestilences, than another not so seasonably cared for. We cannot carry these measures of protection and improvement too far, but we should be prepared to witness their occasional failure. Scarlatina respects them little; indeed, Hirsch thinks that the rich are apt to suffer more from it than the poor, whose condition is less thoroughly hygienic; my own experience agrees with this view; at any rate, I am sure that negroes, poor and slaves, whether from peculiarity of race, I will not say, suffer less than their masters. And the same has been remarked as to Diphtheria, both here and in South America; by Odriozola in Lima, and Arch

Smith in Peru. Verollet affirms, that the Kalmuck, in his vast steppes and open plains, "the type of man in robust health," lost as large a proportion, 51 per cent., as the pent-up inhabitants of crowded Cities from cholera.

Its promptness of action, and the tenacity with which it retains its hold, are qualities of contagion deserving of remark. Bousquet and Itard tried to wash away vaccine just after insertion, but in vain. Bousquet also destroyed the pustule when formed, but the constitutional affection, he says, went on. Renault, of the Alfort Veterinary College, attempted to arrest the poison of Glanders forty-eight, twenty-four, twelve hours after insertion, but failed. Yet, it will be inactive in some cases, as in hydrophobia indefinitely; in all of them for a certain time, not dormant entirely, perhaps, but going through regular and well-defined stages of incubation, varying for each, and subject to a certain extent of modification. This latent period not only varies in different diseases, but may present striking diversities in the same malady. When the contagious matter is introduced by inoculation, we have a well-defined period of development usually calculable, as in Small-pox, Vaccine, Chancre, &c. In Vaccine, however, it may be delayed a few days or a week; a case is on record, in which it lay dormant six months, and then proceeded regularly through its stages.

Of those that are not inoculable, or not usually communicated in that way, we cannot speak with so much precision. It is the general impression, and I think very well founded, that there is a correspondence observable with the septenary periodicity—the latency enduring fourteen or seven, or twenty-one days. Yet, the exceptions noted, are numerous and well-marked. Bigelow recites a case of Scarlatina, in which circumstances seem to prove that the disease either broke out only two days after exposure, or remained latent forty days. Typhus has seemed to sicken its victim at once. I need not remark upon the importance of these matters in reference to Prophylaxis, Quarantines, &c.

Again, the tenacity with which Contagion will adhere to certain substances and remain in certain localities, is astonishing. Mills relates an instance, in which the clothes of an infant, dying of small-pox, washed carefully and put away, communicated the dis-

case to another child of the same parents, placed in the same cradle, more than a year after. Burridge gives an example of this tenacity: "A noble and magnificent collegiate hall in Taunton, being infested with this contagion of Scarlet fever, for more than three years, in spite of all that skill and science could suggest for its removal," and concludes that there is no known limit to the durability of the Scarlet fever poison. I have known the odious smell of this dreadful pestilence persist in a house for months, in spite of ventilation, scouring, paint, white-wash and all disinfectants.

It is a curious property of some contagions, that they destroy the susceptibility upon which they have acted, and thus protect the system against their own recurrence. This effect would be less strange and more explicable, if it were uniform, but it is not so. Some of them seem devoid of this power, and the others possess it in different degrees. Nay, it would seem, that one at least, Erysipelas in contrast rather increases the tendency of the subject to a second or third attack, and so on indefinitely.

I know not that this quality of self-protection, belongs to any other than contagious affections, and it occurs in so large a proportion of these, that it suggests a fair presumption of the contagiousness of any malady that exhibits it clearly. It is not probably absolute in any. Measles, as far as my observation goes, is most remarkable for it. I have never yet seen a second attack of this very frequent and familiar disease. Next in order, perhaps, stands Small-pox; yet many exceptions are recorded here. Some persons, nay, we are told that some whole families never lose their liability to it, and deaths have been mentioned of second, third, fourth, and one of an eighth attack.

The Typhic fevers present, in this respect, all of them of continued type, an impressive difference from the periodical, malarial, intermittent and remittent fevers; all of which pave the way for their own return. Typhoid fever rarely assails again a subject remaining in the same locality.

It is scarcely worth the time occupied in stating them, to notice the two hypotheses, that have been offered as vaguely explanatory of the observed facts. One is, that all human subjects are born with certain unknown elements—solid or fluid—bound up in the

tissues or component parts, solid or fluid of the body, which have some relevancy to the nature of the diseases alluded to, as furnishing seat, nidus or pabulum to them; and that in performing this office, each according to its elective affinity, they are worn out, consumed, eliminated, or undergo a metamorphic change, which unfits them for a repetition of the same purpose. The analogy suggested is agricultural, as when a certain vegetation uses up all the material in the soil fitted for its growth.

Others, following Daubeny's view, that plants, like animals, give out exhalations or exuvial matters, which are not only effete but deleterious, have ventured the strange guess, that these maladies leave something behind them in the system, which prevents their taking root again in it.

Yellow Fever, whose whole history is peculiar, has been somewhat too emphatically spoken of as the *Acclimating* Fever, because a subject born within its habitual domain, or once recovering from it, and not estranging himself by absence, will scarcely ever be attacked by it a second time. Such is, indeed, the very general rule, and happily, we are thus provided with exempts for medical attendance and nursing.

I wish I could speak with the same confidence concerning Cholera. I know not what degree of exemption, if any, compensates for suffering from it. I have a friend, who has gone through it thrice, in Asia, Europe and America.

This property affords us always the choice of time and circumstance, for passing through dangers almost inevitable; of which, however, little avail is made except in reference to Small-pox. All the world rejoices in the discovery, made so long, and so widely acted on in the East, both in Africa and Asia, that the memory of man runs not beyond it, that inoculated Small-pox, for some mysterious reason, is vastly less severe and dangerous than when taken through the atmosphere. Still further, and if possible, more mysterious is the fact, for which we revere the memory of the illustrious Jenner, who reduced it to practical utility, that a different contagion, or the same, modified to a most harmless mildness, would also exhaust the susceptibility, and protect the system from it.

Whether we can carry this plan of inoculation into the other

contagions, remains to be ascertained. It is asserted by the Physicians of Northern Europe to be applicable in *Lues Venerea*—the constitutional liability to which, is affirmed to be exhausted by repeated insertions of syphilitic matter. *Scarlatina* and measles have, it is also affirmed, been conveyed by inoculation with blood and tears, and *Schneiderian mucus*; but the statements require confirmation and repetition. This we know, however, and I think should unhesitatingly, though prudently, act upon it with proper reserve. As every child seems destined to undergo, at some period, an attack of Scarlet fever, of Measles, of Hooping Cough, and of Mumps, and as these diseases, occurring as local Epidemics, exhibit at different times, marked differences of violence and pestilential malignity, it would surely be a wise and rational course, to submit the child to the chances of contagious impression at some time, and on some occasion when the malady was prevailing in a mild type, and when the constitution of the subject, was in proper condition, or could be properly prepared.

A reasonable anxiety to prevent the influence of Contagion and arrest the progress of contagious diseases, urges us to repeated and varied experiment, in which the most unwearied perseverance is to be encouraged. I need not surely say a word in favour of hygienic measures, as calculated, not only to destroy sources from which such disease may arise, but to lessen unquestionably, if not the liability or predisposition to these maladies, as to all others, at any rate the tendency and proclivity to yield and sink under their violence. I will, however, refer again to efforts directed against the noxious action of the matter of contagion, when subjects have been exposed to it. Poisons inserted in wounds may be rendered innocuous. We cannot, perhaps, wash them out, but Ricord says that venereal inoculation may be rendered inert during three or four days by the use of chemical caustics. Poisoned arrows were formerly used in war, and it was fully believed that suction within a short time after the wound was received, would remove the venom. Barry says that pressure on the part, will also prevent the absorption. I will propose, in all cases of poisoned wounds, the employment, in preference, of the actual cautery, as alone worthy of our confidence. It destroys whatever poison may remain unabsorbed,

and also reduces to an amorphous and inactive mass, the solids in the neighbourhood, changing by chemical annihilation, so to speak, the whole composition of both solids and fluids implicated. It would be well, I think, to extend the same treatment to dissection wounds, received in the examination of diseased bodies.

The celebrated St. Simon, having been bitten by a mad dog, cauterized the wound himself, with a glowing red-hot coal. We read of him, that, for a long while after, he kept a loaded pistol at hand, resolved to commit suicide if ever he became aware of the approach of hydrophobia. I have always burnt with the white iron, subjects so unfortunate as to be wounded by rabid animals, and have not known this method of prevention fail in any case. But I have known the lunar caustic fail, both in this, and in dissection wounds. Youatt trusted to it, and applied it in his own case, having been bitten by a mad cat. It is stated that he died by his own act, leaving no explanation, and I cannot avoid the conjecture, that he carried out the intention of St. Simon, under the fearful expectation of the terrible malady.

Prophylactics are proposed for more than one contagious affection, and they should not be set aside lightly without fair trial. I mention, as worthy of farther experiment, Belladonna, for Scarlatina; *Sarracenia purpurea*, for Small-pox; for Typhic fever, as well as for the Malarial, Quinia; for Cholera, Bowerbank recommends the drinking of Sulphuric acid diluted, which is also valued as antidotal to lead-poisoning. The Easterns, from time immemorial, have employed inunction as a general prophylactic; and indeed, as some of the contagions, perhaps most of them, act upon and enter through the skin, this protection, by oil, seems reasonable enough.

Such are the means of individual precaution, but we must not neglect to consider briefly, the important question of prevention in behalf of the masses of communities of Cities and of nations. Is it possible to circumscribe the spread of a contagious epidemic? Can we arrest its progress—assuming the correctness of the common belief that it comes, that it goes? Are the modes of extension, progress, communication or conveyance so definitely understood that we can interfere with them, and oppose a check, or inter-

pose a barrier of any kind? What is the experience of the past upon this subject.

A natural and powerful instinct teaches us to avoid the sick labouring under any known or suspected contagion. The love of life, the fear of death, the dread of suffering all impel us to measures of self-preservation. But our instincts, when inordinately active, when carried into excess, become degrading, vicious, cruel, criminal. Friends stand aloof from friends, the lover deserts his mistress, the husband his wife, brothers and sisters forget the fraternal tie, and even the parent and the child fly from each other under the disgraceful panic. We shudder with horror, and blush for our common humanity, when we read the stories recorded by Thucydides, De Foe, Hodges and Brockden Brown, of such abandonment of the victims of pestilence. While Leprosy prevailed in Europe, the miserable wretch who manifested the early symptoms of this frightful malady, was at once expelled from his home, and driven into exile, and his whole future life burdened by most stringent and odious regulations. The Church, itself, laid its heavy hand upon him, condemning him to a living death, of which Monteil has given us the repulsive details. Led in gloomy procession to the chapel by the clergy of his parish, they chaunted over him the prayers for the dead, with the ordinary aspersions and incense. He was then taken out of the town or village to the hut where he was to reside; there he was again prayed with and exhorted to patient submission under his irreversible doom in this world, and to hopeful faith in another and better, where he would again bloom in health and joy. Clothed in a particular and well known dress, and furnished with a rattle, which he must always use to give notice of his approach, he was enjoined never to leave his abode in any other costume, never to go barefooted, never to pass into a narrow street, never to speak to any one, unless standing to leeward, nor to enter a church, a mill, a fair, a market or any collection of persons whatever, nor to drink or to wash his hands, either in a fountain or any river, to take up any article of merchandise before buying it, to touch children, or to give them anything; finally, earth was thrown over his head, and the poor outcast left by all—alone—not even to be buried when he died, in consecrated ground. “In some provinces,” says

Monteil, "they burn the clothing, furniture, and even the house of the leper; every where, his vineyard, his cow, his sheep are safe; no one will touch them; for it seems that he and his land, and all that belongs to him, are struck with the same plague."

Such was then the treatment of the man, whose condition was believed to endanger the health of his fellows. The system of quarantine, which has long prevailed, and still exists in some parts of Europe and Asia, and especially on the shores of the Mediterranean, is little less inhuman. The real objection to any of these measures of precaution, however, is not their cruelty, but their uncertainty or inefficiency. The sacrifice of individuals, even in large numbers, for the good of the whole, is a familiar idea, and defensible enough, as well in peace as in war, provided the result is certain, and the infliction indispensable. Gamgee, and many other Physicians in England, have urged that every ox seized with the rinderpest, should be killed at once, even if the whole present generation should thus be exterminated. The oidion of the vine and orange would have been cheaply got rid of on those terms. But we cannot so deal with our fellow-men; we cannot reason thus *de vita hominis*, nor extinguish human life in cold blood, to arrest a pestilence. Our rights over each other are too limited; and besides this our success is always problematical. And if we cannot sacrifice a life, it becomes a question how far we may rightfully proceed to put it in special peril, and inflict certain and special suffering, by seclusion, by imprisonment, by great and varied privation. To make a quarantine available and efficient, these inflictions are inevitable; it is clear that nothing beyond the inevitable, the indispensable in the interests of humanity, admits of justification or defence.

But greater hardship, more despotic tyranny cannot be imagined than to stop a traveller on his way homeward, or in the pursuit of his lawful business; to confine him closely, nay, to insulate and disconnect him from all that concerns or belongs to him, and this for a length of time, always tedious and often indefinite, and under contingencies that subject him to peculiar risk of disease and death. Before we sanction such measures, let us obtain a distinct view of the good which is to compensate, if any thing can compensate, for so much positive evil.

The absurdity of the Quarantines in operation, in our own enlightened age and Country, cannot be exaggerated. Our great commercial metropolis offers an almost incredible history of error and mismanagement. She kept up a receptacle for all forms of pestilence in the narrowest part of the entrance to her magnificent harbour, in the midst of an increasing population of thronged and busy villages, at an easy distance from her wharves, and still nearer those of another large City, with ready access to both, and to the surrounding country, by boats and steamers and railroads. When the hideous nuisance could no longer be tolerated, and was ended abruptly by fire and force, look for a moment at the arrangements substituted. A vessel or two at anchor—no footing or shore for many months, and through a hot and plague-threatened Summer, with most imperfect shelter for the sick detained—no accommodation prepared for the healthy whom they hold for precaution—no place nor means for separation!

A quarantine on a dairy farm near London, Friern, is described by Dickens in his "Household Words," which might serve, if not as a model, yet as affording valuable hints: "All newly purchased cows are first placed in a separate field, during four or five weeks; the man who attends on and milks them is not permitted to touch, nor indeed to come near any of the cows in the great pasture. The proprietor himself, when he has purchased strange cows, or even been to market, invariably changes all his clothes, and generally takes a bath, before he ventures among his own herd." Would to Heaven, the Obstetrician and the general Practitioner would observe similar precautions! We should be apt to hear less, I think, of puerperal and infantile mortality.

A rational Quarantine should be established at some insulated point. Besides the residence of the officers and attendants, there should be a hospital to receive the sick, and a comfortable hotel, at a sufficient distance, to accommodate the sound, whom it is necessary to detain during the latent period of infection, and until the last appearance of disease has passed away. A separate convalescent house should also be provided. No communication beyond the limits of the institution should be permitted during the presence of any pestilence. The term of confinement should be prudently

calculated, and rendered as brief as is consistent with the public safety.

But after all, such are the facilities for evasion—such the wide outlets for escape, that if there were not, every now and then, some undisputed and remarkable examples of the beneficial working of even the present insufficient and impotent establishments, one would be disposed to advocate free trade in disease, as well as in commerce, and shrink from the responsibility of imposing the terrible burdens which a strict quarantine brings upon every City, in the immediate financial injury, the pecuniary losses, the obstruction of all business, and the cessation of the several employments by which the poor are enabled to provide for their subsistence. Believing, as I do, in the contagious communicability of many varieties of disease, I can hardly consent to the entire abolition of protective restrictions; but I would have them regulated with special relevancy to the ascertained risk, and with the most reticent regard to the personal rights and necessities of all those unfortunately involved; while I would every where, and at all times place a more confident dependence upon the institution of the widest, most unsparing, repressive and exacting observance of all the rules of a scientific and enlightened Hygiene.

